

Robert Y. Lewis

CONTACT INFO

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EMPLOYMENT

- 2021 – Present **Brown University**, Providence, RI, USA
Lecturer, Computer Science
- 2018 – 2021 **Vrije Universiteit Amsterdam**, The Netherlands
Postdoc, Theoretical Computer Science
Hired through the [Matryoshka](#) ERC Starting Grant
- Summer 2016 **Wolfram Research**, Champaign, IL, USA
Intern, Mathematica Algorithms R&D
- 2010 – 2012 **St. Agnes Academy**, Houston, TX, USA
Secondary School Teacher
10th grade geometry, 11th and 12th grade pre-calculus, 12th grade AP Calculus AB

EDUCATION

- 2012 – 2018 **Carnegie Mellon University**, Pittsburgh, PA, USA
PhD, Pure and Applied Logic, 2018
MS, Mathematics, 2015
MS, Logic, Computation, and Methodology, 2014
- Summer 2015 **University of Newcastle**, NSW, Australia
Visiting student, [CARMA](#) Priority Research Centre
- 2006 – 2010 **Rice University**, Houston, TX, USA
BA, Mathematics and Philosophy

PEER REVIEWED PUBLICATIONS

Formalizing the ring of Witt vectors

Johan Commelin and Robert Y. Lewis

Hritcu, C. and Popescu, A., eds., *10th ACM SIGPLAN International Conference on Certified Programs and Proofs* (CPP 2021)

Normalizing casts and coercions

Robert Y. Lewis and Paul-Nicolas Madelaine

In Fontaine, Reummer, and Tournet, eds., *Practical Aspects of Automated Reasoning* (PAAR 2020)

Maintaining a library of formal mathematics

Floris van Doorn, Gabriel Ebner, and Robert Y. Lewis

In Benzmüller and Miller, eds., *13th Conference on Intelligent Computer Mathematics (CICM 2020)*

The Lean mathematical library

The mathlib Community

In Blanchette, J., Hritcu, C., eds., *9th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2020)*, pp. 367-381. 2020

This paper describes a collective project with many contributors. I am a maintainer of the project and wrote much of this paper.

Formalizing the solution to the cap set problem

Sander Dahmen, Johannes Hölzl, and Robert Y. Lewis

In Harrison, J., O’Leary, J., and Tolmach, A., eds., *Interactive Theorem Proving (ITP 2019)*, pp. 15:1-15:19. 2019

A formal proof of Hensel’s lemma over the p -adic integers

Robert Y. Lewis

In Mahboubi, A., Myreen, M. O., eds., *8th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2019)*, pp. 15-26. 2019

An extensible ad hoc interface between Lean and Mathematica

Robert Y. Lewis

In Dubois, C. and Paleo, B. W. eds., *Proof eXchange for Theorem Proving 2017 (EPTCS)*, pp. 23-38. 2017

A heuristic prover for real inequalities (journal version)

Jeremy Avigad, Robert Y. Lewis, and Cody Roux

Journal of Automated Reasoning 56(3), pp. 367-386. 2016

A heuristic prover for real inequalities

Jeremy Avigad, Robert Y. Lewis, and Cody Roux

In Klein, G. and Gamboa, R., eds., *Interactive Theorem Proving (ITP 2014)*, pp. 61-76. 2014

Energy-minimizing unit vector fields

Leobardo Rosales, Robert Y. Lewis, et al

Involve 3(4), pp. 435-450. 2010

BOOKS AND THESES

Mathematics in Lean (a tutorial on the Lean theorem prover for mathematicians)

Jeremy Avigad, Kevin Buzzard, Robert Y. Lewis, and Patrick Massot

Under development; available [online](#)

Logic and Proof (a textbook using the Lean theorem prover)

Jeremy Avigad, Robert Y. Lewis, and Floris van Doorn

Available freely in [interactive](#) and [static](#) versions

Two Tools for Formalizing Mathematical Proofs (dissertation)

Robert Y. Lewis

Certified Feb 16, 2018

Polya: A Heuristic Procedure for Reasoning with Real Inequalities (MS thesis)

Robert Y. Lewis

Certified Dec 11, 2014

TEACHING

Fall 2021	Formal Proof and Verification (Brown)
Spring 2021	Logic and Modeling (VU, online)
Fall 2020	Introduction to Computer Science (theory week) (VU, online)
Spring 2020	Logic and Modeling (VU, online)
Spring 2019	Logic and Modeling (VU)
Spring 2018	Logic and Modeling (VU, teaching assistant)
Fall 2016	Logic and Mathematical Inquiry (CMU)
Spring 2015	Nature of Mathematical Reasoning (CMU)
Fall 2014	Models and Methods of Optimization (CMU, teaching assistant)
Summer 2014	Nature of Mathematical Reasoning (CMU)
Spring 2014	Undecidability and Incompleteness (CMU, grader and guest lecturer)
Fall 2013	Formal Logic (CMU, grader and guest lecturer)
2010 – 2012	Geometry, Pre-calculus, AP Calculus AB (St. Agnes Academy)
2007 – 2010	Honors Calculus III/IV, Honors Linear Algebra (Rice, grader)

STUDENTS

All students at VU Amsterdam.

2021	Polina Boneva (BS thesis)
2019	Kevin Kappelmann (MS intern)
2019	Paul-Nicolas Madelaine (MS intern)
2018 – 2019	Markos Dermitzakis (BS thesis)
2018 – 2019	Phillip Lippe (MS research assistant)
2018 – 2019	Miko Kuijn (MS thesis)
2018	Pablo Le Hénaff (MS intern)

AWARDS, GRANTS, AND HONORS

2020	Microsoft Research on Azure grant (\$10k)
2019 – 2023	Senior Collaborator, Lean Forward NWO Vidi grant
2017	Laboratory of Symbolic and Educational Computation research fellowship
2017	Future Faculty , Eberly Center for Teaching Excellence & Educational Innovation
2015 – 2016	William S. Dietrich II Presidential PhD Fellowship
2014	Honorable Mention, NSF Graduate Research Fellowship Program

SERVICE

2021	Organizer, Lean Together 2021 workshop
2020	Proposal assessor, NWO Open Domain Science – XS scheme
2020	Certified Programs and Proofs 2021 Conference Program Committee
2020	Organizer, Formal Methods in Mathematics / Lean Together 2020 workshop
2019 –	Maintainer, Lean mathlib library
2019	Organizer, Lean Together 2019 workshop
2018	Organizer, ICMS session on Formal and Informal Mathematical Corpora
2018	Artificial Intelligence and Symbolic Computation Conference Program Committee
2015, 2016	CMU Philosophy Dept. Graduate Admissions Committee
2015	CMU Philosophy Dept. 30th Anniversary Conference Planning Committee
2014 – 2018	Founding member, CMU chapter of Minorities and Philosophy
2013 – 2017	Organizer, CMU Philosophy Dept. Graduate Research Sharing Forum
2011 – 2012	Coach and sponsor, St. Agnes Academy Engineering/Robotics Team
2008 – 2010	Coordinator and tutor, SRC Society of Academic Fellows, Rice University

SELECTED PRESENTATIONS

Metaprogramming and tactic writing and Dealing with numbers

- [Lean for the Curious Mathematician](#), virtual. 07/2020.

Simplifying casts and coercions

- [PAAR 2020: Practical Aspects of Automated Reasoning](#), virtual. 06/2020.

The Lean mathematical library

- [CPP 2020: Certified Programs and Proofs](#), New Orleans, LA, USA. 01/2020.

Formalizing the solution to the cap set problem

- [ITP 2019: Interactive Theorem Proving](#), Portland, OR, USA. 09/2019.
- [Vietnam-USA Joint Mathematical Meeting](#), Quy Nhon, Vietnam. 06/2019.
- [CARMA Workshop on Computer-Aided Proof](#), Newcastle, NSW, Australia. 06/2019. (Invited speaker.)

A formal proof of Hensel's lemma over the p -adic integers

- [CPP 2019: Certified Programs and Proofs](#), Cascais, Portugal. 01/2019.
- [Lean Together 2019](#), Amsterdam, The Netherlands. 01/2019.

A heuristic method for formally verifying real inequalities

- [Matryoshka 2018](#), Amsterdam, The Netherlands. 06/2018.
- [Hales60](#), Pittsburgh, PA, USA. 06/2018. (Invited speaker.)

Toward AI for Lean, via metaprogramming

- [AITP 2018: Artificial Intelligence in Theorem Proving](#), Aussois, France. 03/2018.

The Lean theorem prover, for mathematicians

- Western University Mathematics Dept. Foundations Seminar, London, ON, Canada. 12/2017.

An extensible ad hoc interface between Lean and Mathematica

- [ICMS 2018: International Congress on Mathematical Software](#), South Bend, IN, USA. 07/2018.
- [PxTP 2017: Proof eXchange for Theorem Proving](#), Brasília, Brazil. 09/2017.
- [Wolfram Technology Conference](#), Champaign, IL, USA. 10/2016.

Automation and computation in the Lean theorem prover

- [HaTT: Hammers for Type Theory](#), IJCAR, Coimbra, Portugal. 07/2016.
- [AITP 2016: Artificial Intelligence in Theorem Proving](#), Obergurgl, Austria. 04/2016.
- TU München Logic and Verification Seminar, Munich, Germany. 03/2016.

Algebra and analysis in the Lean theorem prover

- [MAP 2016: Effective Analysis](#), Marseille, France. 01/2016.

Dependent types and the algebraic hierarchy

- [Workshop on Mathematics and Computation](#), Newcastle, NSW, Australia. 06/2015.

A heuristic prover for real inequalities

- [ITP 2014: Interactive Theorem Proving](#), Vienna, Austria. 07/2014.
- [6th Podlasie Conference on Mathematics](#), Bialystok, Poland. 07/2014.
- CMU Graduate Research Sharing Forum, Pittsburgh, PA. 12/2013.

Energy-minimizing vector fields of unit length

- Rice University VIGRE Summer Seminar, Houston, TX. 07/2009.